Have IFRS changed how stock prices are associated with earnings and book values?

Evidence from Norway

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Abstract

Purpose – The purpose of this paper is to examine how the mandatory shift from Norwegian Generally Accepted Accounting Principles (NGAAP) to International Financial Reporting Standards (IFRS) in Norway affected the valuation weights of earnings and book values, with the aim of gaining insights that are relevant for standard setters, investors and other users of accounting information.

Design/methodology/approach – The authors extend the IFRS literature on structural shifts between the pre- and post-adoption periods by comprehensively controlling for factors that vary between the IFRS sample and the domestic Generally Accepted Accounting Principles (GAAP) sample. Moreover, the tests are designed to reveal the underlying accounting causes of the observed differences in value relevance.

Findings – IFRS are balance sheet-oriented and emphasize measurement at fair value. By contrast, NGAAP are earnings-oriented and focus on historical cost. IFRS also differ from NGAAP by recognizing more intangible assets. Overall, IFRS are thus less conservative than NGAAP. It was found that expanded fair value accounting increases the value relevance of book values and decreases the value relevance of earnings. However, the improved matching of intangible asset expenditures with the future economic benefits of such intangible assets increases the persistence and value relevance of earnings relative to book values.

Originality/value – This paper introduces a test methodology that is designed to identify the effects that specific accounting differences between the IFRS sample and the domestic GAAP sample have on value relevance. Consequently, this paper not only identifies the overall effects on value relevance but also contributes to the literature by identifying specific accounting differences between IFRS and GAAP that cause these overall effects, and thus obtain insights that are valuable for standard setters and other users of accounting information.

Keywords Regulation, IFRS, Intangible assets, Accounting conservatism, Fair value, Historical cost

Paper type Research paper

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1. Introduction

The European Union (EU) required all exchange-listed firms within the European Economic Area (EEA) to adopt International Financial Reporting Standards (IFRS) in their consolidated financial statements beginning January 1, 2005[1]. A parallel process has occurred in Australia and, subsequently, in other countries, such as Brazil. IFRS adoption by the EEA and an increasing number of individual countries is one of the most significant regulatory events in the history of financial accounting, making IFRS the most widely accepted financial reporting model in the world. Therefore, financial statement users, standard setters and regulators must understand the implications of IFRS to function effectively. We use this mandatory transition to IFRS to examine whether the usefulness of accounting information has changed from an investor-oriented perspective. The intention of the International Accounting Standards Board (IASB) is for IFRS to be relevant to the economic decisions of capital market participants. We examine whether adopting IFRS has altered the associations between stock market values and summary accounting measures regarding the balance sheet (the book value of equity) and the income statement (earnings). As an important contribution to the literature, this study uses one benchmark Generally Accepted Accounting Principles (GAAP), which allows us to more clearly identify the primary differences in accounting regulation between IFRS and domestic GAAP and to test the basic research question of whether the primary accounting differences between these two regulatory regimes explain the observed differences in value relevance. Our study answers the call of Larson and Herz (2011), among others, for increased academic engagement in the IASB's standard-setting process.

To compare the value relevance of two different accounting regimes, a research methodology must control for effects other than the tested differences in accounting regulation to limit the identification problem discussed, e.g. by Pope and McLeay (2011). The common method of controlling for other effects is to use matched samples (Gjerde *et al.*, 2008; Goodwin *et al.*, 2008; Clarkson *et al.*, 2011). However, matching limits the sample to the year prior to IFRS adoption because financial statements under both accounting regimes can be obtained only for this year. Moreover, matched sampling is sensitive to both the short-term implementation effects of the IFRS adoption process and the restatements that are typically induced by discontinuous operations. Instead, we choose to extend the IFRS literature on structural shifts between the pre- and post-adoption periods (Hung and Subramanyam, 2007; Devalle *et al.*, 2010) by comprehensively controlling for other factors that vary between the IFRS sample and the domestic GAAP sample.

We choose the Norwegian GAAP (NGAAP) as the benchmark for evaluating the mandatory IFRS adoption, a choice that is not random. To compare functional alternatives, we want to limit the comparison of IFRS to only "high quality" domestic GAAP that differ significantly from IFRS in conceptual orientation and in practical recognition and measurement. IFRS are balance sheet-oriented and emphasize measurement at fair value (Dichev, 2008). Consequently, we seek domestic GAAP that are earnings-oriented with a strong focus on transactional (historical) cost measurement as our benchmark[2], which means that we exclude domestic GAAP that have developed with a balance sheet orientation prior to 2005, such as UK GAAP (Paananen and Parmar, 2008), and domestic GAAP with a gradual adoption of IFRS prior to 2005, such as Australian GAAP, Brazilian GAAP, Danish GAAP and Swedish GAAP

(Goodwin *et al.*, 2008; Rodrigues *et al.*, 2012; Thinggaard and Damkier, 2008; Hamberg *et al.*, 2011). Importantly, the application of transactional costs among the remaining domestic GAAP prior to 2005 differs according to whether the prescribed use of accounting estimates, such as the remaining life of an asset, is biased or unbiased. German GAAP, for instance, emphasize a prudent approach to asset valuation and liability recognition to facilitate contracting among stakeholders and thus represent a stakeholder-oriented (and tax-driven) as opposed to a shareholder-oriented accounting system (Hung and Subramanyam, 2007). In general, most Continental and Eastern European countries allow or previously allowed the use of conservative and, therefore, biased accounting estimates (Alexander and Archer, 2003), e.g. because financial accounting remains closely tied to tax accounting or because biased accounting estimates are a consequence of the applied definition of the prudence principle. To provide a challenging benchmark for comparison with IFRS and a well-functioning alternative accounting methodology for investors, we exclude nations with domestic GAAP that allowed the use of biased, often tax-driven accounting estimates. Our three criteria – that the benchmark GAAP should be earnings-oriented, should be based on unbiased accounting estimates and should not be subject to gradual IFRS adoption – leave us with few alternatives. Because Norway represents a stable environment with relatively high investor protection and strict legal enforcement (La Porta *et al.*, 1998), we choose NGAAP as the high-quality representative of an earnings-oriented alternative to the balance sheet-oriented IFRS[3]. High investor protection, well-functioning capital markets and strict legal enforcement induce a low and stable level of earnings management and more informative disclosure in Norway than in EEA countries with lower investor protection (Leuz *et al.*, 2003; DeFond *et al.*, 2007).

NGAAP are based on the transactional costs principle, the matching principle that requires costs to be matched with future revenues and the use of unbiased accounting estimates during the matching process (Johnsen and Eilifsen, 2003). The main difference between IFRS and NGAAP concerns the extent of fair value accounting (Gjerde *et al.*, 2008). In practice, IFRS also recognize more intangible assets by excluding the option of expensing development expenditures (when these expenditures satisfy the definition of an asset) and by not allowing goodwill to be amortized. Overall, given the two major differences between IFRS and NGAAP, NGAAP are more conservative than IFRS, according to the definition from Feltham and Ohlson (1995).

We find that the increased use of fair value accounting under IFRS increases the valuation weight of book values and decreases the valuation weight of earnings. More frequent and larger revaluations make reported earnings less persistent and thus less value-relevant (Ohlson, 1995). Conversely, we find that increased recognition of intangible assets decreases the valuation weight of the balance sheet and increases the valuation weight of the income statement. Better matching of investment expenditures with future economic benefits increases the persistence of earnings (Dichev and Tang, 2008), which increases the valuation weight of reported earnings. We document that the net effect of the transition from NGAAP to IFRS is the increased value relevance of book values. Regarding the balance sheet, the fair value effect is more significant than the opposing effect of the increased recognition of intangible assets. Regarding the income statement, the two effects appear to cancel one another out, with no net effect on the value relevance of earnings.

Several prior studies have investigated the effects of IFRS adoption on value relevance and focus on overall changes in explanatory power and regression coefficients (Gjerde *et al.*, 2008; Hung and Subramanyam, 2007; Devalle *et al.*, 2010). However, as noted by Nissim and Penman (2008), pure correlations and general response coefficients do not offer standard setters much help in resolving specific policy questions, such as questions related to recognizing intangible assets or the use of fair value. Moreover, a major weakness of the IFRS adoption literature is that differences that have been observed in value relevance have not been adequately explained by differences in accounting regulation (principles and methods) (Brown, 2011); when differences in value relevance are observed, the underlying causes are rarely identified through formal research methods. As Clarkson *et al.* (2011, p. 1) note, "The problem of identifying the effects of changes in accounting standards per se has plagued the IFRS mandatory adoption literature".

The primary contribution of our study is that it applies a unique test methodology that allows us to split investors' response coefficients to accounting information by accounting regime and by several accounting attributes that are commonly recognized as important drivers of value relevance. Thus, we are able to identify the underlying causes of the differences that are observed in value relevance. We show that two regulatory changes that both reduce the degree of accounting conservatism, respectively, greater recognition of intangible assets and increased measurement at fair value may have opposite effects for the valuation weights of earnings and book values. Collectively, our results have implications for standard setting and accounting regulation and illustrate how the benefits and costs of IFRS adoption in general and of intangible asset recognition and fair value accounting in particular can be identified (Schipper, 2010). For instance, with regard to measuring the usefulness of IFRS adoption from an investor's perspective, i.e. the changes in value relevance following the new accounting regime, samples from countries with different domestic GAAP cannot be universally aggregated because of accounting differences; instead, the costs and benefits must be related to the specific GAAP that are used prior to IFRS adoption. Moreover, the findings suggest that the effects of IFRS adoption on value relevance may be highly sensitive to firm characteristics.

The remainder of the study is organized as follows: Section 2 provides a short summary of the differences between IFRS and NGAAP. Our hypotheses regarding how investors "respond" to accounting information under IFRS relative to NGAAP are outlined in Section 3. Section 4 presents the methodology for testing the hypotheses. The data and descriptive statistics are discussed in Section 5. Section 6 performs the statistical tests of the hypotheses and discusses the results. Robustness tests are performed in Section 7. Section 8 concludes the study.

2. IFRS versus NGAAP

IFRS are based on a balance sheet-oriented conceptual framework[4] that defines assets and liabilities; equity is the residual. IFRS have increased the use of fair value as the measurement basis for assets and liabilities after their initial recognition on the balance sheet. However, the use of transactional costs as the measurement basis is widely accepted and is frequently an equal option – e.g. for property, plant and equipment and intangible assets – and when there is no reliable measurement of fair value. Under the balance sheet orientation, revenue represents (in principle) increases in assets or

decreases in liabilities; expenses are increases in liabilities or decreases in assets. Although some fair value revaluations according to IFRS are recorded as other comprehensive income, other revaluation gains and losses are reported as earnings. Fair value revaluations make earnings more nonrecurring or transitory compared with historical cost accounting.

The most important regulations of NGAAP are the Accounting Act of 1998 and the accounting standards issued by the Norwegian Accounting Standards Board (Johnsen and Eilifsen, 2003). NGAAP are based on an earnings-oriented conceptual framework in which investment expenditures are matched with corresponding revenues to calculate a period's earnings based on unbiased accounting estimates, e.g. for the economic lives of assets and their residual values. Nevertheless, the matching principle is combined with prudence: the cost value, net of the accumulated depreciation, is written off to the recoverable amount if an impairment loss occurs and is reversed to a maximum of the initial cost if the value increases again. In principle, there is no other revaluation, i.e. there is no write-up to fair value if the value is above cost. However, liquid financial instruments are recorded at fair value if they can be measured reliably.

The difference between IFRS and NGAAP may appear to be considerable. Nonetheless, in practical terms, the two accounting regimes are not very different for important classes of assets, such as most inventories, property, plant and equipment. Table I lists the most important differences between IFRS and NGAAP. The expanded fair value accounting under IFRS is related primarily to financial instruments (IAS 39), investment property (IAS 40) and biological assets (IAS 41).

As shown in Table I, we note an important difference between IFRS and NGAAP that is in addition to the extent of fair value accounting; IFRS offer greater recognition of assets than NGAAP. Increased recognition of assets is related to intangible assets (IAS 38), particularly purchased goodwill, which is not amortized, and the capitalization of development expenditures. In general, assets are more frequently omitted from or understated on the balance sheet under NGAAP; thus, NGAAP are expected to be more conservative than IFRS.

3. Hypothesis development

Based on Ohlson (1995), Penman (1998) develops a valuation model in which the stock price is a linear function of the book value of equity and the capitalized value of earnings per share:

$$\text{PRICE} = (1 - w) \cdot \text{BVPS} + w \cdot m \cdot \text{EPS}, \quad (1)$$

where PRICE is the stock price of firm i at time t, BVPS is the book value of equity per share, EPS is the current period's earnings per share, w is the valuation weight of capitalized earnings, i.e. $m \cdot \text{EPS}$, and m is the multiplier that capitalizes the earnings. In this model, the choice of accounting regulation (principles and methods) affects the accounting variables and their weights. Because the valuation weights amount to one, an increase in the valuation weight of BVPS is always compensated by a decrease in the valuation weight of EPS, and vice versa. Thus, the effect of a change in accounting regulation is a change in the valuation weights of the balance sheet and the income statement; the stock price is independent of the accounting regulation (which is consistent with the efficient market hypothesis). Increased book value conservatism and earnings persistence following a change in accounting regulation can be shown to

Table I.
Primary differences in practices between IFRS and NGAAP during 2001-2008

Main areas of differences	IFRS	NGAAP
Goodwill and other intangible assets with indefinite economic lives	Capitalization as assets when satisfying the asset definition and criteria for recognition. Tested annually for impairment. No amortization. Internally generated goodwill is not recognized	Capitalization of investment expenditures as assets to be matched with future economic benefits. After recognition, the intangible assets are amortized and tested annually for impairment. Internally generated goodwill is not recognized
Research and development expenditures	Research expenditures should be expensed when incurred. Development expenditures should be capitalized as assets if they satisfy the criteria for recognition as assets	Both research and development expenditures could be capitalized as an asset, but there is an option to expense both when incurred. In practice, few exchange-listed firms capitalized R&D
Provisions for future expenditures	Capitalized as liabilities as long as they satisfy the criteria for being recognized as such. The definition of liabilities is interpreted strictly, not allowing for future periodic maintenance expenditures to be capitalized as a provision, for example. Instead, IFRS treat periodic maintenance as an investment when incurred	Capitalized as debt to be matched with corresponding revenues. Periodic maintenance could also be accounted for as investments because it also results in matching expenses with their corresponding benefits
Biological assets and investment property	Should be capitalized as assets and measured according to fair value, if the fair value can be measured reliably	Should be capitalized at cost, depreciated if long-lived and tested for impairment
Financial instruments	Measurement at fair value, unless fair value cannot be measured reliably	Measurement at nominal value, except for short-term financial instruments traded in a liquid market

Source: Gjerde *et al.* (2008, pp. 94-95)

increase the valuation weight of earnings at the expense of the valuation weight of book values (Ohlson, 1995, pp. 670-672; Feltham and Ohlson1996, pp. 223-224; Penman1998, equation (9) In Section 2, we identified two major differences between IFRS and NGAAP: greater recognition of intangible assets and more fair value accounting under IFRS.

First, increased recognition of intangible assets decreases conservatism and increases earnings persistence because of better matching (Dichev and Tang, 2008). Thus, the predicted net effects of the greater recognition of intangible assets on the valuation weights are unclear; increased persistence is predicted to increase the valuation weight of earnings at the expense of the valuation weight of book values, whereas reduced conservatism is predicted to increase the valuation weight of book values at the expense of the valuation weight of earnings. Empirically, Lev and Sougiannis (1996) examine the value relevance of capitalizing research and development expenditures relative to expensing them as they are incurred; see also Lev and Zarowin (1999). These studies suggest that recognizing R&D expenditures as assets increases the value relevance of earnings.

Second, increased fair value accounting provides clearer predictions than increased recognition of intangible assets because both balance sheet conservatism and earnings persistence are reduced. Earnings persistence is diminished because of transitory revaluations in earnings; thus, the valuation weight of earnings is expected to decrease in favor of the valuation weight of book values (Ohlson, 1995). Empirically, Duh *et al.* (2012) find that the fair value accounting of financial items under IFRS (IAS 39) increases earnings volatility, and Hann *et al.* (2007), among others, document that fair value accounting contributes to the impairment of the value relevance of earnings; see also Beisland (2014) for similar evidence.

Collectively, the two major differences in accounting regulation between NGAAP and IFRS are expected to increase BVPS relative to PRICE, which means that the accounting becomes less conservative according to the definition of Feltham and Ohlson (1995). The expected net effect is thus that, *ceteris paribus*, the weight on BVPS increases toward 1 and that the weight on earnings decreases toward 0. However, we cannot rule out the possibility that the increased capitalization of intangible assets might work in the opposite direction. Overall, based on empirical studies and insights from simple valuation models, we can expect greater recognition of intangible assets and increased measurement at fair value under IFRS to contribute to explaining the differences in the valuation weights of book values and earnings. Therefore, we propose the following hypotheses:

H1. The association between book values and market values is higher and the earnings response coefficient (ERC) is lower for firms reporting under IFRS than for firms using NGAAP.

H2. The changes in the valuation weights of book values and earnings after IFRS adoption interact with the major changes in accounting regulation, i.e. greater recognition of intangible assets and increased measurement at fair value.

Are these hypotheses also substantiated by previous empirical research examining the effects of the 2005 IFRS adoption on value relevance? In general, the literature presents mixed results. For example, Devalle *et al.* (2010) find structural breaks in the book value association (BVA) and ERC for several countries, but both the sign and magnitude vary across countries.

Some of the diversity in the findings from the literature may be attributed to the fact that many studies of IFRS adoption have focused on voluntary adoption (Hung and Subramanyam, 2007, who acknowledge that their results "may not reflect the effects of mandatory adoption" [p. 653]). Another challenge is that most studies rely only on observations from 2004, with one set of observations prepared according to domestic GAAP and another restated set of observations prepared according to IFRS (Clarkson *et al.*, 2011; Gjerde *et al.*, 2008). The results of these studies are sensitive to short-term implementation effects, various types of transitory restatements and the economic conditions of that particular year (Barth *et al.*, 1998). Nonetheless, we believe that the primary explanation for the highly diverse results in the IFRS adoption literature can be attributed to differences in domestic GAAP, the benchmarks for the IFRS evaluation. The effects of IFRS adoption on value relevance are unlikely to be similar across different prior GAAP, and if standard setters, investors and other users of accounting information are to acquire more detailed knowledge about the mechanisms that drive changes in value relevance, then isolating the underlying causes of the observed changes in value relevance is of utmost importance. Although some studies propose fair value accounting and intangible asset recognition as possible explanations for their findings (Hung and Subramanyam, 2007; Gjerde *et al.*, 2008; Paananen and Parmar, 2008), they do not perform formal tests to prove their contentions.

4. Test methodology

H1 and *H2* can be tested by expanding regression models that are commonly used in value relevance studies to account for two different financial reporting regimes, IFRS and NGAAP:

$$\begin{aligned} SMT = {} & \alpha_0 \cdot FIX + \alpha_1 \cdot ACC + \alpha_2 \cdot IFRS + \alpha_3 \cdot ATTR + \alpha_4 \cdot ACC \cdot IFRS \\ & + \alpha_5 \cdot ACC \cdot ATTR + \alpha_6 \cdot ATTR \cdot IFRS + \alpha_7 \cdot ACC \cdot ATTR \cdot IFRS + \varepsilon, \end{aligned} \quad (2)$$

where SMT is either the stock market valuation (price) or the stock performance (return) of firm i at time t or over period t. FIX = (INDU, YEAR) is a vector of indicator variables for fixed industry and year effects. ACC is a vector of appropriate accounting variables, where the specific variables depend on whether a price or a return regression model is specified (see below for further details). IFRS is an indicator variable for accounting regime that equals 1 if firm i reports according to IFRS during period t and equals 0 if the firm reports according to NGAAP. ATTR is a vector of other attributes that influence SMT, either directly or through interactions.

Two SMT variables are emphasized in examining the value relevance of the accounting measures (Francis and Schipper, 1999; Lev and Zarowin, 1999). In the price regression model, the stock price (PRICE) is regressed on the book value of equity per share (BVPS) and earnings per share (EPS). Thus, SMT = PRICE, and ACC = (BVPS, EPS). In the return regression model, the stock market return (RET) is explained by the price-deflated earnings (EARN) and the price-deflated change in earnings (DEARN). Thus, SMT = RET, and ACC = (EARN, DEARN).

We denote the sensitivity of the market valuation or performance to accounting variables, ∂ SMT/∂ ACC, as the "accounting association coefficient" or simply the AAC. In (2), the AAC equals:

$$\partial \mathrm{SMT}/\partial \mathrm{ACC} = \alpha_1 + \alpha_4 \cdot \mathrm{IFRS} + \alpha_5 \cdot \mathrm{ATTR} + \alpha_7 \cdot \mathrm{ATTR} \cdot \mathrm{IFRS}. \quad (3)$$

When ACC = BVPS, the AAC can be referred to as the BVA, which measures the association between market and book values per share. When ACC = EPS, EARN or DEARN, the AAC is commonly referred to as the long-window (ERC).

In this study, we analyze the degree to which IFRS affects the AAC. The influence of IFRS on the AAC is equal to:

$$\partial \mathrm{AAC}/\partial \mathrm{IFRS} = \alpha_4 + \alpha_7 \cdot \mathrm{ATTR}. \quad (4)$$

ATTR represents attributes that are associated with the stock market (SMT) either directly or through their interactions with IFRS and ACC. Three types of variables are represented in our study:

(1) test variables (INTAN, FAIR);

(2) other value relevance – related variables (LOSS, SPEC, MVOL); and

(3) risk and scale variables (BETA, SIZE, BTM).

The test variables INTAN and FAIR represent the two major changes in accounting regulations following IFRS adoption.

Specifically, INTAN is a measure of the extent to which intangible assets are recognized and capitalized on the balance sheet. FAIR is a measure of the extent of fair value accounting. The extensive use of control variables combined with the inclusion of the test variables INTAN and FAIR in the value relevance regressions enables us to relate possible differences in value relevance directly to the primary differences between NGAAP and IFRS. This unique test methodology is generalizable and can be applied to test the effects on value relevance of any change in accounting regulation following IFRS adoption (or, in even more general terms, the effect of differences between any two sets of accounting rules on value relevance). One challenge with this test methodology is that hand-collected data from the notes to the financial statements are required to construct certain test and control variables.

To test *H1*, as specified in the previous section, we restrict α_7 to 0 in Model (2) and thus equation (4). Consequently, equation (4) is simplified to ∂ AAC/∂ IFRS = α_4 (unconditional of ATTR). *H1* implies that $\alpha_4 > 0$ for the BVA and that $\alpha_4 < 0$ for the ERC. *H2* aims to explain the unconditional effect of IFRS on the BVA and the ERC through the use of the test variables INTAN and FAIR, respectively. An approach that is conditional on INTAN and FAIR, which are included in the ATTR vector, must be used, which makes equation (4) appropriate. *H2* implies, e.g., that $\alpha_{71} < 0$ and $\alpha_{72} > 0$ for the BVA and that $\alpha_{71} > 0$ and $\alpha_{72} < 0$ for the ERC, where the numbers of the subscripts refer to the variable order in the ATTR vector. Hence, ∂ AAC/∂ IFRS is expected to be associated with INTAN (the first variable in the ATTR vector) and FAIR (the second variable).

When evaluating the impact of INTAN and FAIR on the value relevance of IFRS versus NGAAP, it is important to control for other variables that have been documented to influence the value relevance and for possible risk and scale differences (Pope and McLeay, 2011). Thus, these control variables must be added to ATTR, the vector of attributes beyond ACC and IFRS that affect SMT. LOSS is an indicator variable for negative earnings. When earnings relevance is diminished because of losses, book

values become more important (Hayn, 1995). SPEC is the proportion of transitory, nonrecurring or special earnings or an indicator variable for a firm with a high proportion of special earnings. Nonrecurring earnings, such as large asset impairments, are less value-relevant than recurring earnings (Elliott and Hanna, 1996; Hann *et al.*, 2007). MVOL is market volatility or an indicator variable of high market volatility; cf. the finding of Francis and Schipper (1999) that value relevance depends on the variability of SMT. BETA is a measure of systematic stock market risk. Moreover, according to Fama and French (1993), firm size (SIZE) and the book-to-market ratio (BTM) are relevant proxy risk factors for the cross-section of firms.

5. Data sample

We have collected market and accounting data for all the firms listed on the Oslo Stock Exchange from 2001 to 2008 that reported according to IFRS and NGAAP. Because the firms have been required to report according to IFRS since 2005, IFRS are the dominant accounting regime from 2005 to 2008. To obtain relatively equal sample sizes, we also include four years of NGAAP financial statements, i.e. 2001-2004. According to Table II, the total number of firm-year observations equals 1,264. Of these observations, 623 are IFRS observations, and 641 are NGAAP observations.

In Table III, all the variables are defined and their computations are explained in detail. Table IV lists the distributional statistics for the total sample and for the IFRS and NGAAP subsamples.

Table IV shows that the average stock price in the combined sample equals NOK 86.837, whereas the corresponding equity value per share is 66.304, and the corresponding earnings per share is 6.114. As is typically the case, the distributions of the stock price and the two key accounting numbers are skewed to the right. Focusing on the median to reduce the impact of skewness, the price/book ratio is 1.536, and the price/earnings ratio is 13.502. The difference in the median price/book ratios between the IFRS and the NGAAP samples is 0.428, and this difference is highly significant. The difference in the median price/earnings ratio is −1.080, which is only weakly significant. These two differences are consistent with *H1*. Table IV further reveals that the median earnings yield is 4.9 per cent of the market value, whereas the median change in the earnings yield over the financial year is 0.5 per cent.

Table IV presents the distributional statistics of the accounting attribute variables and control variables. The first variable, IFRS, is an indicator variable that equals 1 for observations from the IFRS sample and 0 for observations from the NGAAP sample. The average value of IFRS is 0.492, which indicates that the two subsamples are almost

Table II. Sample selection and variable definitions: sample selection on the Oslo Stock Exchange

Variable	Firm-year observations
Firm-year observations of PRICE, BVPS and EPS 2001-2008	1,606
Lacking observations when lagging and calculating changes	176
Firm-year observations of RET, EARN and DEARN	1,430
Lacking observations of accounting attribute and control variables	166
Sample with a complete set of variables	1,264
NGAAP observations	641
IFRS observations	623
Number of companies in the selected sample	271

FIX	Fixed effects in terms of industry (INDU) and year (YEAR) effects. Thus, FIX = (INDU, YEAR)
PRICE	The stock price of firm i = 1, 2, . . ., N = 271 at the end of financial year t = 2001, 2002, . . ., 2008. The price three months after the end of the financial year is used as a robustness check
BVPS	The book value of equity of firm i at the end of year t, including provisions for the proposed dividends and excluding noncontrolling interests, divided by the number of outstanding shares at year end
EPS	Firm i's reported earnings per share in year t
RET	The dividend-adjusted excess stock return of firm i in year t, where excess indicates the return in excess of the estimated risk-free rate
EARN	The reported earnings per share of firm i during year t, deflated by the previous year's stock price at the year's end. Thus, $EARN = EPS/PRICE_{t-1}$
DEARN	Price-deflated change in earnings per share. Thus, $DEARN = (EPS_t - EPS_{t-1})/PRICE_{t-1}$
IFRS	Indicator or dummy variable that equals 1 when firm i reports according to IFRS and 0 when firm i reports according to NGAAP in year t
INTAN	Indicator variable for intangible asset – intensive firms. INTAN is measured in two ways. INTAN1 is an indicator variable for firms with a high ratio of intangible assets relative to total assets, i.e. above the 75th percentile. Alternatively, INTAN2 is an indicator variable for firms in industries with presumably high intangible asset intensity, i.e. the biotechnology, information technology and communications industries
FAIR	Proxy variable for fair value-intensive firms. FAIR is estimated in several ways. FAIR1 is an indicator variable for firms with a high ratio of financial assets, except cash, relative to total assets, i.e. above the 75th percentile. FAIR2 is an indicator variable for firms with a high absolute value of financial nonrecurring earnings relative to the lagged stock price. FAIR3 = FAIR1 · FAIR2. Finally, FAIR4 is an indicator variable for banks and other financial institutions
LOSS	Indicator variable that equals 1 when EPS and EARN < 0 and 0 when EPS and EARN ≥ 0
SPEC	Indicator variable for firms with a high level of special or nonrecurring operational items. A high level is measured by a high absolute value of the ratio of operational nonrecurring earnings per share relative to the previous year's stock price, i.e. above the 75th percentile
MVOL	Indicator variable for years with high market volatility, i.e. above the 75th percentile. Market volatility is measured as the monthly standard deviation of the equally weighted stock market index, based on monthly excess returns for the 12 months before the end of the financial year
BETA	Beta is an estimate of systematic risk (cf. the CAPM) and is estimated from the time series 12 months before the end of the financial year
SIZE	Firm size is a proxy risk factor. Firm size is lagged and measured as the logarithm of the previous year's average market value of equity, where the average is calculated on a monthly basis
BTM	Book-to-market ratio is a proxy risk factor. The book value of equity is lagged and calculated as the average over the previous year's monthly book-to-market ratios

Table III.
Sample selection and variable definitions: definition of variables

Table IV.
Descriptive statistics

Variable	Obs	Mean	SD	Minimum	Q_1	Median	Q_3	Maximum
Panel A: Price regression variables								
PRICE	1,264	86.837	136.631	0.140	9.000	39.950	116.000	1,101.000
BVPS	1,264	66.304	142.018	−0.700	5.299	22.823	87.281	1,534.263
EPS	1,264	6.114	19.026	−40.939	−0.232	1.531	8.581	139.379
P/B	1,251	2.236	2.303	0.191	0.986	1.536	2.591	17.778
P/E	880	28.374	62.372	1.139	9.057	13.502	21.852	561.734
IFRS								
PRICE	623	83.719	126.849	0.533	9.050	35.100	105.500	778.000
BVPS	623	52.768	87.008	0.098	4.624	20.066	59.401	529.950
EPS	623	6.391	17.527	−35.193	−0.121	1.404	8.255	100.362
P/B	623	2.651	2.789	0.192	1.097	1.787	3.207	17.778
P/E	447	32.551	77.801	1.139	8.379	12.824	22.022	561.734
NGAAP								
PRICE	641	89.868	145.544	0.140	8.950	43.500	122.500	1,101.000
BVPS	641	79.460	179.146	−0.700	6.612	26.568	104.782	1,534.263
EPS	641	5.845	20.388	−40.939	−0.421	1.639	8.786	139.379
P/B	628	1.824	1.586	0.191	0.935	1.358	2.137	9.147
P/E	433	24.063	40.370	1.702	9.681	13.904	21.392	291.682
Panel B: Return regression variables								
RET	1,264	0.100	0.789	−1.000	−0.371	−0.003	0.369	4.781
EARN	1,264	0.014	0.202	−0.853	−0.033	0.049	0.101	0.556
DEARN	1,264	0.058	0.589	−2.422	−0.048	0.005	0.064	5.481
IFRS								
RET	623	0.026	0.685	−0.941	−0.445	−0.055	0.345	3.207
EARN	623	0.036	0.133	−0.281	−0.021	0.049	0.096	0.556
DEARN	623	−0.005	0.174	−0.732	−0.048	0.004	0.046	0.652

(*continued*)

Table IV.

Variable	Obs	Mean	SD	Minimum	Q_1	Median	Q_3	Maximum
NGAAP								
RET	641	0.172	0.873	−1.000	−0.292	0.039	0.394	4.781
EARN	641	−0.009	0.249	−0.853	−0.057	0.049	0.105	0.530
DEARN	641	0.120	0.805	−2.422	−0.048	0.006	0.095	5.481
Panel C: Accounting attributes and control variables								
IFRS	1,264	0.492	0.500	0.000	0.000	0.000	1.000	1.000
INTAN1	1,264	0.250	0.433	0.000	0.000	0.000	1.000	1.000
INTAN2	1,264	0.232	0.422	0.000	0.000	0.000	0.000	1.000
FAIR1-2	1,264	0.250	0.433	0.000	0.000	0.000	1.000	1.000
FAIR3	1,264	0.077	0.266	0.000	0.000	0.000	0.000	1.000
FAIR4	1,264	0.173	0.379	0.000	0.000	0.000	0.000	1.000
LOSS	1,264	0.303	0.460	0.000	0.000	0.000	1.000	1.000
SPEC	1,264	0.250	0.433	0.000	0.000	0.000	1.000	1.000
MVOL	1,264	0.275	0.447	0.000	0.000	0.000	1.000	1.000
BETA	1,264	0.964	0.703	−0.347	0.409	0.859	1.362	3.491
SIZE	1,264	6.859	1.684	2.933	5.662	6.695	7.921	11.649
BTM	1,264	0.796	0.885	−0.001	0.349	0.581	0.902	7.313

Notes: P/B is the price/book ratio, i.e. PRICE/BVPS with BVPS $>$ 0. P/E is the price/earnings ratio, i.e. PRICE/EPS with EPS $>$ 0. Other variables are defined in Table III. Obs is the number of firm-year observations, mean is the sample average, SD is the standard deviation, Min is the minimum, Q_1 is the first quartile, Median is the second quartile, Q_3 is the third quartile, and Max is the maximum observation. PRICE is registered at the end of the financial year, and RET is measured over the financial year. PRICE, BVPS, EPS, RET, EARN, DEARN, P/B, P/E, BETA, SIZE and BTM are winsorized with cutoffs at the 1st and 99th percentile separately for the IFRS and NGAAP samples

balanced. In Section 2, we documented that the main accounting differences between IFRS and NGAAP are greater recognition of intangible assets and increased measurement at fair value under IFRS. To represent these differences, we use several proxies for INTAN and FAIR.

INTAN1 is an indicator variable for highly intangible asset–intensive firms, which represents those firms with a ratio of intangible assets relative to their total assets that is above the 75th percentile. The mean value is 25 per cent (32.9 per cent for the IFRS sample and 17.3 per cent for the NGAAP sample). INTAN2 is an indicator variable for firms in industries with a priori high intensity of intangible assets, defined as biotechnology, information technology or communications industries. The percentage of "new economy" observations in the total sample is 23.2 per cent (26.8 per cent for the IFRS sample and 19.7 per cent for the NGAAP sample). As shown in Table V, the correlation between INTAN1 and INTAN2 is 0.454 (highly significant). Because the two measures are not perfectly correlated, they capture somewhat different aspects of firms' intangible asset intensities.

FAIR1 is an indicator variable for firms whose financial assets (cash excluded) divided by total assets are above the 75th percentile. The percentage of financial asset–intensive firms in the total sample becomes 25 per cent (21.3 per cent for the IFRS sample and 28.8 per cent for the NGAAP sample). FAIR2 is an indicator variable for firms with (scaled) financial nonrecurring items above the 75th percentile, where financial nonrecurring items include revaluations of financial assets due to fair value measurement[5]. The mean is 25 per cent (22.8 per cent for the IFRS sample and 27.1 per cent for the NGAAP sample). FAIR3 is combination of FIN1 and FIN2: specifically, FIN3 = FAIR1 · FAIR2. The mean of FIN3 is 7.7 per cent (7.5 per cent for the IFRS sample and 7.8 per cent for the NGAAP sample). FIN4 is an indicator variable for banks and other financial institutions. The mean is 17.3 per cent. There are relatively fewer financial institutions in the IFRS sample than in the NGAAP sample (13.2 per cent for the IFRS sample and 21.4 per cent for the NGAAP sample) because several minor savings banks continued to report according to NGAAP for several years after 2004. The correlation between the fair value proxies is highest for FAIR1 and FAIR4 and equals 0.735 (Table V).

The next three variables in Table IV are related to the properties of earnings and book values and function as control variables for changes in the accounting association coefficients (Hayn, 1995; Elliott and Hanna, 1996; Francis and Schipper, 1999). LOSS, the indicator variable for negative earnings, shows that 30.3 per cent of the observations in our sample are losses. SPEC, the indicator variable for special earnings intensity, is

Variable	INTAN1	INTAN2	FAIR1	FAIR2	FAIR3
INTAN2	0.454				
FAIR1	−0.253	−0.222			
FAIR2	−0.156	−0.192	0.076		
FAIR3	−0.125	−0.137	0.499	0.499	
FAIR4	−0.255	−0.252	0.735	−0.018	0.245

Table V.
Correlation matrix for INTAN and FAIR proxies

Note: The Pearson correlation coefficients are significant at the 1 per cent level, tested two-sided, except for −0.018, which is insignificant

equal to 1 when the absolute value of the sum of operating nonrecurring items scaled by the ingoing market value of equity is above the 75th percentile (i.e. the most extreme observations) and is equal to 0 otherwise[6]. Thus, the proportion of observations related to extensive transitory earnings is 25 per cent. MVOL is an indicator variable for yearly market volatility above the 75th percentile, which indicates that two years are considered high-volatility years (2002 and 2008). A total of 27.5 per cent of the observations are from these two years.

The final three variables are risk factors or proxy risk factors that are expected to influence expected returns. BETA is estimated by the market model, and the average beta is 0.964. SIZE is the logarithm of the stock market value of the firm at the beginning of the year. The average value of the SIZE variable is 6.859. BTM is the book-to-market ratio, and its average is 0.796.

6. Main tests of the hypotheses

To test *H1* and *H2*, we begin by estimating Model (2) as a price regression model[7]. Table VI reports the coefficient estimates for the restricted model that is used to test *H1* and then the coefficient estimates for the unrestricted model that is used to test *H2*. We focus the discussion only on the effects of the changes in accounting regulation that are discussed in the hypothesis development section (i.e. the shaded rows).

The effect of IFRS on the "accounting association coefficients" [AAC = (BVA, ERC)] is estimated by Model (2) with α_7 restricted to 0. Consequently, equation (4) is reduced to ∂ AAC/∂ IFRS = α_4. The impact of IFRS on the AAC is represented by the α_4 vector alone, with one coefficient for book values and one coefficient for earnings. According to the first regression of Table VI, the effect of IFRS on book values, i.e. on ∂ BVA/∂ IFRS, is estimated to be 0.472 and is found to be highly significant (with $p < 0.010$). Thus, the "book value association" (BVA) is clearly higher in the IFRS sample than in the NGAAP sample. The effect of IFRS on the long-window ERC is estimated to be −0.150; it is negative, as predicted, but statistically insignificant (with a p-value above 0.100). Consequently, we can only reject the null hypothesis in favor of our alternative (*H1*) for book values. A major weakness in the IFRS adoption literature is that previous studies tend to only use versions of this restricted model, and they are thus unable to identify the causes of the observed changes in value relevance.

Therefore, we next estimate the unrestricted model, Model (2). By letting α_7 be estimated freely, we are able to test for factors that contribute in explaining the average effects of IFRS on the AAC, as suggested by equation (4). From the second regression model of Table VI, we observe that INTAN1, our first measure of intangible asset recognition, is associated with an estimated decrease in ∂ BVA/∂ IFRS of −0.420. Therefore, even if the average effect of IFRS on the BVA is positive and equal to 0.472, a separate negative impact of −0.420 on the BVA is included in the average effect for firms with high intangible asset intensity. The impact of INTAN1 is insignificant, however. If we focus instead on the change in the ERC following IFRS adoption, we note that the partial effect of INTAN1 on ∂ ERC/∂ IFRS is 2.908 and significant (with a p-value below 0.050). The influence of FAIR1, our first measure of fair value accounting, on the association between the BVA and IFRS is 0.587, which is a highly significant impact. The effect of FAIR1 on the association between ERC and IFRS is −2.223 but is

Variable	Coefficient	*t*-value	Coefficient	*t*-value
FIX	Yes		Yes	
BVPS	0.439***	3.48	0.613***	5.76
EPS	4.940***	5.93	4.032***	4.77
IFRS	−26.041**	−2.05	−25.808**	−2.24
INTAN1	−12.915***	−2.57	−12.745**	−2.34
FAIR1	20.985***	2.74	26.341***	3.42
LOSS	−15.348***	−2.93	−14.126***	−3.01
SPEC	−5.042	−0.98	−7.166	−1.36
MVOL	10.951	0.92	4.397	0.35
BVPS · IFRS	0.472***	4.50	0.193	0.82
BVPS · INTAN1	0.628***	4.79	0.867***	3.69
BVPS · FAIR1	0.059	0.48	−0.146	−1.36
BVPS · LOSS	0.253*	1.85	0.204	1.32
BVPS · SPEC	−0.065	−0.59	−0.179*	−1.72
BVPS · MVOL	−0.003	−0.05	0.022	0.32
EPS · IFRS	−0.150	−0.28	1.441	1.00
EPS · INTAN1	−0.055	−0.11	−1.748	−1.46
EPS · FAIR1	−2.153***	−3.04	−1.140	−1.44
EPS · LOSS	−2.302***	−3.44	−3.238***	−3.32
EPS · SPEC	−1.526**	−2.33	0.034	0.04
EPS · MVOL	−0.222	−0.44	−0.112	−0.17
INTAN1 · IFRS	−3.684	−0.60	−6.260	−0.94
FAIR1 · IFRS	−20.748**	−2.12	−39.965***	−3.51
LOSS · IFRS	3.838	0.56	3.561	0.56
SPEC · IFRS	2.036	0.33	8.334	1.20
MVOL · IFRS	7.292	0.49	28.993**	1.99
BVPS · INTAN1 · IFRS			−0.420	−1.44
BVPS · FAIR1 · IFRS			0.587***	2.57
BVPS · LOSS · IFRS			0.249	1.00
BVPS · SPEC · IFRS			0.217	1.03
BVPS · MVOL · IFRS			−0.299**	−2.24
EPS · INTAN1 · IFRS			2.908**	2.10
EPS · FAIR1 · IFRS			−2.223*	−1.79
EPS · LOSS · IFRS			4.009***	2.91
EPS · SPEC · IFRS			−2.584**	−2.11
EPS · MVOL · IFRS			−1.546	−1.54
Adjusted R^2	0.910***	$F = 211.32$	0.915***	$F = 203.02$
Number of observations	1,264		1,264	

Notes: Complete model: $\text{PRICE} = \alpha_0 \cdot \text{FIX} + \alpha_1 \cdot \text{ACC} + \alpha_2 \cdot \text{IFRS} + \alpha_3 \cdot \text{ATTR} + \alpha_4 \cdot \text{ACC} \cdot \text{IFRS} + \alpha_5 \cdot \text{ACC} \cdot \text{ATTR} + \alpha_6 \cdot \text{ATTR} \cdot \text{IFRS} + \alpha_7 \cdot \text{ACC} \cdot \text{ATTR} \cdot \text{IFRS} + \epsilon$, where FIX = (INDU, YEAR), ACC = (BVPS, EPS), ATTR = (INTAN1, FAIR1; LOSS, SPEC, MVOL); all variables are defined in Table III. In the nested model, $\alpha_7 = 0$. The coefficients are estimated by OLS, and the standard deviations and, hence, the statistical inferences are adjusted for heteroskedasticity and autocorrelation (HAC). *, ** *** indicate significance at the 10, 5 or 1% level, respectively, tested two-sided. The net effect of IFRS on the AAC and the marginal impact of INTAN and FAIR are shaded in gray

Table VI.
Tests of *H1* and *H2* using price regression models: full specifications

only weakly significant (with a p-value between 0.050 and 0.100). Our findings are consistent with *H2*; because of the lack of significance for two of the four coefficients, we can only claim partial (and not general) support for *H2*.

Consequently, we may conclude that IFRS contribute to increasing the value relevance of the balance sheet, i.e. the book value of equity, primarily because of increased fair value accounting. The effect of increased intangible asset recognition on the value relevance of the balance sheet is negative; therefore, this effect works in the opposite direction of the dominant effect of fair value accounting. The net effect of IFRS on the value relevance of earnings is insignificant. However, we find that the partial effect of greater intangible asset recognition is an increase in the value relevance of earnings, whereas the partial effect of more fair value accounting appears to be a reduction in the value relevance of earnings. These two effects cancel one another.

7. Robustness tests

Price regression models have been criticized for their potential scale effects (Barth and Kallapur, 1996). Although we have controlled for fixed industry and year effects, we use two further treatments to reduce the likelihood of scale differences between the IFRS and the NGAAP samples. First, we use firm size and other potential scale factors as additional control variables. Next, we expand the analysis by using return regressions, in which the variables are deflated by the lagged price as the scale factor. We also use scale factors that are associated with expected returns, i.e. risk variables, as further control variables. The model then becomes a model of abnormal returns with presumably negligible scale effects.

Table VII reports the results of the price regression models with ATTR extended by BETA, SIZE and BTM to reduce potential scale effects and to account for any risk differences. To limit the length of Table VII, we report only the coefficients in relation to the impact of IFRS consistent with equation (4). We observe that the unconditional ∂

	δ BVA/δ IFRS		δ ERC/δ IFRS	
Variable	Coefficient	t-value	Coefficient	t-value
Fixed effect	0.198	0.50	−0.546	−0.25
INTAN1	−0.576**	−2.06	3.183**	2.42
FAIR1	0.428**	2.05	−1.415	−1.31
LOSS	0.226	0.90	3.784***	2.83
SPEC	0.228	1.12	−2.208*	−1.85
MVOL	−0.334**	−2.29	−2.101**	−2.04
BETA	0.075	0.47	−0.461	−0.59
SIZE	0.028	0.49	0.078	0.31
BTM	−0.282*	−1.78	1.291	1.46
δ AAC/δ IFRS	0.449***	4.63	−0.425	−0.87

Notes: The coefficients are estimated using regression models identical to those used in Table VI, except that ATTR is extended to (INTAN1, FAIR1; LOSS, SPEC, MVOL; BETA, SIZE, BTM). Only $\delta\,\mathrm{AAC}/\delta\,\mathrm{IFRS} = \alpha_4 + \alpha_7 \cdot \mathrm{ATTR}$, where AAC = (BVA, ERC), is reported. The net effect on AAC and the marginal impact of INTAN and FAIR are shaded in gray. *, ** *** indicate significance at the 10, 5 or 1% level, respectively, tested two-sided, after using HAC robust standard deviations. The adjusted R^2 is 92.9%

Table VII. Tests of *H1* and *H2* using price regression models: impact of IFRS on the BVA and ERC with the extended set of control variables

BVA/∂ IFRS decreases from 0.472 in Table VI to 0.449 in Table VII, and both coefficients are highly significant. Similarly, the unconditional ∂ ERC/∂ IFRS decreases from −0.150 to −0.425, and neither coefficient is significant[8].

The impact of INTAN1 on the relationship between BVA and IFRS, i.e. on ∂ BVA/∂ IFRS, increases as the coefficient decreases from −0.420 in Table VI to 0.576 in Table VII, and the latter coefficient is significant. Similarly, the effect of INTAN1 on the association between ERC and IFRS, i.e. on ∂ ERC/∂ IFRS, increases from 2.908 to 3.183, and both coefficients are significant. The influence of FAIR1 on the relationship between BVA and IFRS is reduced from 0.587 to 0.428, and both coefficients are significant. Finally, the impact of FAIR1 on the association between ERC and IFRS increases from −2.223 to −1.415, and the latter coefficient is insignificant. These findings indicate that the predictions in *H2* regarding intangible assets are strengthened by our extended control for scale effects but that the predictions regarding fair value are slightly weakened, as the impact of fair value on the ERC changes from being weakly significant to being insignificant.

Because INTAN1 and FAIR1 are only proxies for intangible asset recognition and fair value accounting, we also use alternative proxies (INTAN2, FAIR2, FAIR3 and FAIR4) as robustness checks. There are seven more combinations of INTAN and FAIR proxy pairs to study. Regarding the overall effect of IFRS on the AACs, the seven new pairs produce significantly positive effects on the BVA, whereas their effects on the ERC are insignificantly negative; the results are similar to the previous results, and the coefficients are therefore not tabulated. The prediction from Model (1) that a positive change in the BVA is associated with a negative change in the ERC is confirmed in all regression analyses.

Table VIII summarizes the impact of the additional seven pairs of INTAN and FAIR proxies on the ability of IFRS to alter the BVA and the ERC. We observe that all the coefficients have signs that are consistent with those reported in Table VII and that are consistent with *H2*'s predictions. The ability of the INTAN and FAIR proxies to explain

Table VIII. Tests of *H1* and *H2* using price regression models: impact of IFRS on the BVA and ERC for different INTAN and FAIR proxies

Test pairs	δ BVA/ δ IFRS Coefficient	*t*-value	δ ERC/ δ IFRS Coefficient	*t*-value
1) INTAN1	−0.531*	−1.79	1.754	1.29
FAIR2	0.389***	2.78	−2.052**	−2.04
2) INTAN1	−0.467	−1.57	2.912**	2.08
FAIR3	0.614***	3.33	−1.989*	−1.84
3) INTAN1	−0.706***	−2.65	2.516*	1.94
FAIR4	0.443**	2.15	−0.809	−0.80
4) INTAN2	−1.382***	−2.70	2.336	1.56
FAIR1	0.411**	2.01	−1.288	−1.20
5) INTAN2	−1.051**	−2.08	2.268	0.84
FAIR2	0.364**	2.55	−1.825*	−1.82
6) INTAN2	−1.204**	−2.31	2.156	1.33
FAIR3	0.593***	3.26	−1.737	−1.62
7) INTAN2	−1.177**	−2.37	2.414	1.70
FAIR4	0.438**	2.14	−0.822	−0.82

Note: The INTAN and FAIR proxies are defined in Table III.

the effect of IFRS on the BVA is high (2 of the 16 coefficients remain weakly significant or insignificant), whereas the effect of IFRS on the ERC is frequently insignificant (6 of the 16 coefficients remain significant or weakly significant).

Table IX presents the corresponding results from the return regression models[9]. Although they have the disadvantage of being unable to provide insight regarding the value relevance of book values, the return regression models are less affected by scale. We focus the discussion on the combined impact, i.e. the sum of the ERC of the earnings change and the earnings level.

According to Table IX, the unconditional impact of IFRS on the ERC is 0.129, which is insignificant. The results of the return regression models are consistent with those of the price regression models: the impact of IFRS on the ERC is insignificant. Accordingly, we cannot reject the null hypothesis in favor of *H1* for earnings.

Furthermore, the impact of INTAN1 on ∂ ERC/∂ IFRS in Table IX is 0.179, which is insignificant, whereas the impact of FAIR1 is −2.646, which is significant. The signs of the estimated effects are consistent with those previously found for the price regression models, but the significance changed from INTAN1 to FAIR1. In the test of the full set of FAIR and INTAN proxies, the estimated signs of the impacts of the proxies are always consistent with *H2*, but the significance levels vary, see Table X.

We performed a large number of stability tests and additional robustness tests that further support our conclusions. The tests are not tabulated but are all available upon request.

8. Conclusions

An important contribution of this study is that it documents and advances the understanding of how reduced balance sheet conservatism as the result of adopting IFRS affects the valuation weights of book values and earnings. Several theoretical studies (Ohlson, 1995; Penman, 1998) demonstrate that the choice between conservative

Variable	Level	Change	Sum	*F*-value
Fixed effect	1.983	1.178	3.161	2.47
INTAN1	0.065	0.114	0.179	0.03
FAIR1	−1.670***	−0.976*	−2.646**	6.25
LOSS	0.452	0.396	0.848	0.25
SPEC	−0.206	0.068	−0.138	0.02
MVOL	−0.018	0.001	−0.017	0.00
BETA	−0.812	−0.076	−0.888	0.92
SIZE	−0.046	−0.098	−0.144	0.32
BTM	−0.320	−0.699	−1.019	1.66
δ ERC/ δ IFRS	0.173	−0.044	0.129	0.04

Table IX. Tests of *H1* and *H2* using return regression models: impact of IFRS on the ERC of the level and change in earnings

Notes: Model: $RET = \alpha_0 \cdot FIX + \alpha_1 \cdot ACC + \alpha_2 \cdot IFRS + \alpha_3 \cdot ATTR + \alpha_4 \cdot ACC \cdot IFRS + \alpha_5 \cdot ACC \cdot ATTR + \alpha_6 \cdot ATTR \cdot IFRS + \alpha_7 \cdot ACC \cdot ATTR \cdot IFRS + \epsilon$, where FIX = (INDU, YEAR), ACC = (EARN, DEARN), ATTR = (INTAN1, FAIR1; LOSS, SPEC, MVOL; BETA, SIZE, BTM); all variables are defined in Table III. We report only the impact of IFRS on the ERC of both the level and the change of earnings: δ ERC/δ IFRS = $\alpha_4 + \alpha_7 \cdot$ ATTR. The net effect of IFRS on the ERC and on the marginal impacts of INTAN and FAIR are shaded in gray. *, **, *** indicate significance at the 10%, 5% or 1% level, respectively, tested two-sided, after using HAC robust standard deviations. The adjusted R^2 is 62.2%

Table X.
Tests of *H1* and *H2* using return regression models: impact of IFRS on the ERC of the level and change in earnings for different INTAN and FAIR proxies

Test pairs	Level	Change	Sum	*F*-value
1) INTAN1	0.109	0.246	0.355	0.10
FAIR2	−0.497	−0.295	−0.792	0.66
2) INTAN1	0.099	0.135	0.234	0.04
FAIR3	−1.833**	−1.086	−2.896**	4.26
3) INTAN1	0.100	0.109	0.209	0.03
FAIR4	−0.573	−0.774	−1.347	1.00
4) INTAN2	1.203*	2.190***	3.393***	8.08
FAIR1	−1.521**	−0.897*	−2.418**	5.19
5) INTAN2	1.224*	2.119***	3.343***	7.74
FAIR2	−0.287	−0.022	−0.309	0.12
6) INTAN2	1.338**	2.260***	3.598***	9.11
FAIR3	−1.630**	−0.940	−2.570*	3.66
7) INTAN2	1.081	2.001***	3.082***	6.74
FAIR4	−0.427	−0.617	−1.044	0.59

Note: *, **, *** indicate significance at the 10%, 5% or 1% level, respectively, tested two sided, after using HAC robust standard deviations

transactional cost accounting and fair value accounting is a choice between a value-relevant income statement and a value-relevant balance sheet. Both fair values and transactional costs provide information about future cash flows, but they represent competing methods for conveying information. Consistent with the commonly held assumption that IFRS are more fair value-oriented than most domestic GAAP, we find that the balance sheet's valuation weight increased following IFRS adoption and that this increased valuation weight was (at least partly) at the expense of the ERCs. However, because we apply a test methodology that allows us to split investors' response coefficients to accounting information according to the accounting regime and several accounting attributes that are commonly recognized to be important drivers of value relevance, we are able to identify the sources of the net average effects.

We show that greater recognition of intangible assets and increased measurement at fair value may have opposite effects on the valuation weights of earnings and book values. More fair value accounting according to IFRS is shown to have a positive effect on the value relevance of book values, whereas the increased recognition of intangible assets has a negative effect. The value relevance of earnings increases with increased recognition of intangible assets and decreases with increased measurement at fair value. Fair value revaluations are transitory in nature and lead to less persistent earnings measurement and thus reduced ERCs. The increased recognition of intangible assets, by contrast, leads to better matching of investment expenditures with future revenues and, thus, to more persistent earnings measurements.

Our findings suggest that the effects of IFRS adoption on value relevance may be highly sensitive to firm characteristics and the choice of regulatory benchmarks on which evaluations are anchored (Christensen *et al.*, 2007; Brown, 2011; Clarkson *et al.*, 2011). Whereas this study relies on observations from one country, the findings suggest that the effect of IFRS adoption may differ throughout the EEA and the rest of the IFRS universe, depending on the quality of the domestic GAAP that are used prior to IFRS adoption. Our results have implications for global standard setting and accounting

regulation and can help identify the benefits and costs of IFRS adoption in general and of intangible asset recognition and fair value accounting in particular (Schipper, 2010). Prior research has shown that the value relevance of accounting information can have direct economic consequences, for instance, for liquidity and cost of capital (Hung and Subramanyam, 2007). Therefore, an interesting topic for future research would be to relate the specific accounting differences between IFRS and domestic GAAP to such key economic metrics.

Notes

1. EU Regulation No. 1606/2002. EU regulations also bind Norway, Iceland and Lichtenstein through their memberships in the EEA.
2. Although the conceptual orientation is, in principle, independent of the valuation method for assets and liabilities, a balance sheet orientation is well-suited for fair value measurement, whereas an earnings orientation is better-suited for transactional (historical) cost measurement.
3. Hoogendoorn (1996) concludes that, after the introduction of deferred taxes in 1992, Norway is one of the countries with the highest degree of independence between accounting and taxation. According to Leuz *et al.* (2003), Norway has the sixth lowest earnings management score.
4. In 2010, the IASB's Framework for the Preparation and Presentation of Financial Statements, published in 1989 and governing our sample period of 2001-2008, was superseded by the Conceptual Framework for Financial Reporting. The balance sheet focus in the 1989 Framework continues in the 2010 Framework.
5. Financial nonrecurring items are gains and losses on financial instruments, currency gains and losses, and other transitory items reported among financial revenues and expenses (Beisland, 2014).
6. Operational nonrecurring items are relatively large impairments and other transitory operating items, such as large gains or losses on the sale of operational assets, restructuring charges and special income from associated companies.
7. Thus, SMT = PRICE, FIX = (INDU, YEAR), ACC = (BVPS, EPS) and ATTR = (INTAN1, FAIR1; LOSS, SPEC, MVOL).
8. Further, the persistence of earnings might be evaluated by $EARN_t = a \cdot FIX_t + b_1 \cdot EARN_{t-1} + b_2 \cdot EARN_{t-1} \cdot IFRS_{t-1} + e_t$. We estimate b2 to be −0.367 (the *p*-value equals 0.003). A significant drop in earnings persistence is consistent with increased nonrecurring items in IFRS earnings due to more fair value revaluations reported through the income statement.
9. Model (2) has these specific variables: SMT = RET, FIX = (INDU, YEAR), ACC = (EARN, DEARN) and ATTR = (INTAN, FAIR; LOSS, SPEC, MVOL; BETA, SIZE, BTM).

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